Pension insurance scheme: long-term scenarios and reform options

Demographic developments will put the finances of the statutory pension insurance scheme under pressure in future. The Federal Government intends to permanently keep the replacement rate at its current level of 48% after 2025. It would then remain significantly higher than under the legal status quo. As a result, the contribution rate and the required tax-financed government funds would rise considerably more strongly than previously envisaged.

The level of the replacement rate and the distribution of financial burdens must be considered and determined at the political level. In view of all the uncertainty involved, however, it would be prudent to present the relevant long-term financial effects transparently. This article updates the Bundesbank's long-term simulations from 2019. These are not point forecasts, but they depict relationships and illustrate pension approaches. The simulations start in 2026, i.e. after the expiration of the current transitional arrangements, meaning that they do not focus on the current situation of very high inflation rates.

In the first instance, the simulations depict the legal status quo and compare this with the government's plans (keeping the replacement rate stable at 48%). In both scenarios, the retirement age remains unchanged at 67 years from the 2030s onwards. Compared with the legal status quo, the contribution rate is significantly higher given a replacement rate of 48%, and rises to 29% by 2070. The government funds needed also rise much more steeply, and the federal budget comes under considerably increased pressure.

The article goes on to illustrate two reform options based on the approaches used in many other European countries. The first option, like the government plans, guarantees a fixed replacement rate, but only upon retirement. In the subsequent pension-drawing period, pensions rise in line with inflation. Purchasing power is thus maintained. However, the replacement rate will probably decline markedly over the course of the pension-drawing period, as pensions are likely to rise more slowly than wages. The repercussions for insured persons and pension finances are heavily dependent upon how the reform is structured in concrete terms and how real wages develop over the long term. If the replacement rate is set at 48% upon retirement, pension benefits, the contribution rate and federal government funds are lower than in the government plans. A slightly higher starting value reduces the difference. Insured persons who live longer are thus harder-hit overall by lower pension payments compared with the government plans. On average, however, they also have higher incomes. Such distributional aspects should ultimately be assessed at the political level. A disadvantage of this option is that the longer-term financial development of the pension insurance scheme is less predictable, as it additionally depends on how real wages evolve.

The second reform option ties the statutory retirement age to increasing life expectancy. This prevents the number of pension-drawing years from rising more steeply than the number of contribution years. In the simulation, this ratio remains at roughly the level reached at the beginning of the 2030s from that point onwards. On the basis of current estimates, the retirement age is set to rise to just over 69 years by 2070. Creating this link markedly eases the pressure on the contribution rate and the federal budget. A longer period of employment would see both individual pension benefits and employment rise. This would increase economic output and tax revenue. On the whole, it appears clear why a number of national and international advisory bodies recommend such an approach in Germany's case.

Demographic developments will put pressure on pension funding

Demographic developments will put pressure on pension funding in future

Demographic developments will put the finances of the statutory pension insurance scheme under pressure in future.[1] First, an increasing number of baby boomers will be reaching retirement age by the mid-2030s. Second, life expectancy is likely to increase further.[2] The pension insurance scheme must base itself on the variables in order to remain financially stable. These include, in particular, the (standardised) replacement rate,[3] the statutory retirement age, the contribution rate and the tax-financed funds transferred by central government (government funds).

Thresholds for contribution rate and replacement rate apply up to 2025

Up to and including 2025, the contribution rate and replacement rate are subject to thresholds. The contribution rate, which currently stands at 18.6%, may not exceed 20%. Meanwhile, the replacement rate cannot fall below 48%. As it is already at 48%, pensions up to 2025 will increase in parallel with wages (after deduction of social security contributions and before taxes). The retirement age will initially continue to rise.

Status quo: relatively wide range of variable adjustments again from 2026 onwards

As from 2026, according to current law, there will once again be a more varied mix of adjustments in the variables: first, the replacement rate will decline, meaning that pensions will grow more slowly than wages.[4] Second, the contribution rate will increase. Third, government funds will increase more strongly as they are tied to the rising contribution rate. And, fourth, the statutory retirement age is set to rise – but only up to the start of the 2030s, by which time it will have reached 67 years.

Federal Government plans longer-term minimum threshold for replacement rate: fiscal burden will then rise considerably

The Federal Government plans to stabilise the replacement rate over the long term, i.e. also after 2025, at 48%.[5] The burden would then shift more to contribution payers, to whom the bulk of tax revenue is also attributable. On balance, the contribution rate and tax-financed government funds would rise significantly more strongly than in the current legal situation. Central government would subsequently have to make savings elsewhere or substantially raise taxes. At present, there are no plans to increase the retirement age any further after 2031. The Federal Government has ruled this out for the current legislative period.[6]

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1 For more information, see Deutsche Bundesbank (2022) and Deutsche Bundesbank (2019), pp. 60-62. Government finances are an important part of the Bundesbank's macroeconomic analyses and projections, while the pension insurance scheme is, in turn, a key constituent of government finances. The Bundesbank reports on current developments in the pension insurance scheme at quarterly intervals. It presents more detailed reports on the scheme and, in particular, its longer-term outlook at irregular intervals.

2 The assumptions made for life expectancy are based on the 14th coordinated population projection by the Federal Statistical Office (see Federal Statistical Office (2019)). Meanwhile, the Federal Statistical Office has released updated projections for the medium term up to 2035 (see Federal Statistical Office (2021)). These take into account, first and foremost, actual developments up to the current end. This means that the development of life expectancy is slightly lower than previously assumed. For the period up to 2035, the Federal Statistical Office now assumes that life expectancy at birth will rise slightly less steeply than in previous projections. Remaining life expectancy from the age of 67 is hardly affected by the revisions up to 2070.

3 Definitions of important terms used in the discussion on pensions can be found in Deutsche Bundesbank (2019), pp. 55-56. The replacement rate (pension level after social security contributions but before tax) reflects the ratio of the standard pension to average earnings subject to compulsory insurance. The standard pension is calculated from 45 years of contributions at an average wage. The replacement rate calculated in this manner currently amounts to just over 48%. The standard pension is, therefore, just under half as high as the average earnings of all employees subject to pension insurance contributions (after deduction of social security contributions). This means that it bears no relation to final individual income. The post-tax replacement rate (excluding any other income and child benefit claims) is likely to be markedly higher; see Deutsche Bundesbank (2019), p. 56.

4 This is due, in particular, to the sustainability factor in the pension adjustment formula, according to which pensions grow less strongly than wages (before tax but after deduction of social security contributions) if the ratio of pension recipients to contribution payers increases. A detailed description of this formula can be found in Deutsche Bundesbank (2019), p. 56.

5 See SPD, Bündnis 90/Die Grünen and FDP (2021).

6 According to the coalition agreement, the Federal Government plans to build up a capital stock in the statutory pension insurance scheme. This should help to cushion the rise in the contribution rate. However, this plan has not yet been specified in more detail. The sum of €10 billion referred to in the agreement is insufficient to achieve quantitatively significant effects.

International trends: pensions frequently indexed to prices and retirement age linked to life expectancy

Most European countries index pensions to price developments

Many countries face demographic challenges comparable to those in Germany. A fundamentally wage-oriented pension adjustment after entry into retirement (as is planned in Germany) is uncommon in other places.[7] Most other European and OECD countries index pensions to prices, at least in part. Pure price indexation is used in Austria, for example. Compared with wage adjustment, pensions in payment grow more slowly with price indexation if wages rise more strongly than prices. Such a development is common in economies that are growing in real terms, and is expected to continue into the future. Given price indexation, the individual replacement rate, i.e. the pension level in relation to the average wage of the respective year, declines over the course of the pension-drawing period.[8] This means that, over time, a person's pension rises more slowly than the average wage (after deduction of social security benefits, before tax).

Retirement age systematically linked to life expectancy in many EU countries

In many EU countries, the statutory retirement age is also rising along with life expectancy.[9] This means that not only the pension-drawing period but also the contribution period are getting longer, thus significantly reducing the pressure to adjust the other variables. Some of the national and international institutions that advise the Federal Government on matters of economic policy recommend that the retirement age be tied to life expectancy.[10]

Long-term development of the pension insurance scheme using simulations

Projections illustrate long-term developments and relationships

Bundesbank simulations for various pension approaches

This article builds on the Bundesbank's long-term simulations from 2019 of the financial development of the statutory pension insurance scheme. It updates simulations of the legal status quo and the stable replacement rate of 48% planned by the government. It also illustrates the effects of an inflation-based adjustment of pensions in payment. Furthermore, the article updates and extends simulations linking the retirement age to life expectancy. The simulations start in 2026, i.e. after the replacement rate and contribution rate thresholds applicable up to 2025 have expired. This longer-term perspective does not focus on the current situation, which is characterised, amongst other things, by exceptionally high inflation rates.

Naturally, long-term projections are subject to a high degree of uncertainty. The results of the simulations should not be understood as fore-

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7 Only Denmark currently offers a one-to-one indexation of benefits to wages. Many countries use a mix of price and wage indices. The aim is to curb expenditure growth and thus mitigate the demographically-driven financing problems in the pay-as-you-go system. See OECD (2021), pp. 34-36.

8 A pension adjustment changeover to price indexation was recently also discussed by the Board of Academic Advisors at the Federal Ministry for Economic Affairs and Energy (since renamed the Federal Ministry for Economic Affairs and Climate Action) as well as by the Kommission Verlässlicher Generationenvertrag (Reliable Intergenerational Contract Commission); see Federal Ministry for Economic Affairs and Energy (2021) and Kommission Verlässlicher Generationenvertrag (2020).

9 These countries include, amongst others, Denmark, Italy, the Netherlands and Portugal; see European Commission (2021), p. 56. A similar system is one in which the retirement age is flexible and deductions and add-ons at the time of entry into retirement are tied to rising life expectancy.

10 This is recommended by both international organisations (including the International Monetary Fund (2019) and the OECD (2020)) and national organisations (Board of Academic Advisors at the Federal Ministry for Economic Affairs and Energy; see Federal Ministry for Economic Affairs and Energy (2021) and German Council of Economic Experts (2020)).

Simulation: current legal situation and government plans

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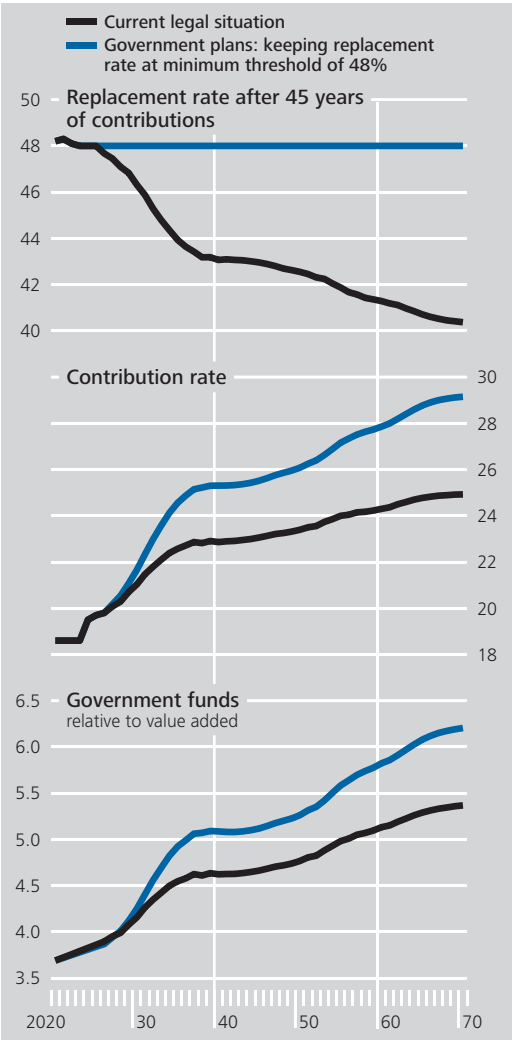

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Projections illustrate long-term developments and increase transparency

casts. The options for pension approaches presented here do not constitute calls or recommendations for action. Rather, the simulations are intended to reveal important trends in the development of the individual variables and the relationships between them. Other approaches are conceivable, such as a different adjustment of the retirement age to life expectancy or a mixed indexation of pensions to wages and prices. Ultimately, it is up to policymakers to decide how they wish to split the demographic burden between the contribution rate, government funds and pensions. However, using long-term projections, they should elucidate the impact of the planned reform from today's perspective under plausible assumptions.[11]

Longer-term outlook: current legal situation and government plans for a permanent replacement rate of 48%

Baseline scenario: the legal status quo[12]

Baseline scenario: contribution rate and government funds rise significantly; nominal pension growth weaker; replacement rate declines

In 2025, the thresholds for the replacement rate (48%) and the contribution rate (20%) will expire. Without follow-up rules, demographic burdens will again be more broadly distributed among the variables from 2026 onwards (see the adjacent chart). In this baseline scenario, the replacement rate falls. However, nominal pensions continue to rise. The baseline scenario simulations produce a replacement rate of 43% at the end of the 2030s, while the figure for 2070 is 40½%.[13] The contribution rate increases to 23% by the end of the 2030s. In 2070, it reaches 25%. Government funds in relation to value added also increase significantly, as they are largely linked to the contribution rate. Up to 2070, government funds in relation to value added will increase by 1½ percentage points from 2021. By way of comparison, this corresponds to the revenue from 4 percentage

11 In its annual pension insurance report, the Federal Government only considers the next 14 years. The most recent report, published in November 2021, looks forward as far as 2035; see Federal Ministry of Labour and Social Affairs (2021). The Board of Academic Advisors at the Federal Ministry for Economic Affairs and Energy, by contrast, has published forecasts extending to the year 2060; see Federal Ministry for Economic Affairs and Energy (2021). The calculations of the European Commission's Ageing Working Group extend as far into the future as 2070; see European Commission (2021).

12 The results are within the spectrum of findings for other simulations; see, inter alia, Börsch-Supan and Rausch (2021), Federal Ministry for Economic Affairs and Energy (2021) and Werding (2021).

13 At the same time, legislators use tax funds to boost funded supplementary pension plans at the individual level (e.g. the "Riester" pension). The aim is for supplementary funded private pension provision to cushion the planned lower replacement rates under the statutory pension insurance scheme; for earlier Bundesbank calculations, see Deutsche Bundesbank (2016). Aside from distribution, potential earnings are coming under particular public criticism.

points of the standard VAT rate from today's perspective.[14]

Government plans: permanent 48% replacement rate

Replacement rate threshold: contribution rate and government funds rise even more steeply

The Federal Government plans to stabilise the replacement rate at 48% on a permanent basis. Pensions will then continue to rise in line with wages after 2025.[15] The simulations show that the contribution rate and government funds will increase steeply in this scenario. The contribution rate in 2070 is set to stand at 29% (+4 percentage points compared with the baseline scenario). In relation to value added, the government funds tied to the contribution rate are around 1 percentage point higher than in the baseline scenario and 2½ percentage points higher than in 2021. To finance the total increase, it would then be necessary to generate revenue from a standard rate of VAT that is 6 percentage points higher overall in 2070, for example. The federal budget would then come under significant pressure. It would thus be prudent to at least consider other pension system approaches that are widely used internationally.

Reform option: after retirement, pensions grow in line with the inflation rate

Initial replacement rate guaranteed, compensation for price increases during pension-drawing period

Indexation to inflation: pensions rise less sharply after retirement

In Germany, pension entitlements before and after retirement are indexed using the same pension adjustment factor. This means that the replacement rate for a person entering retirement is identical to that of individuals already drawing pensions (for equivalent pension contributions in the past).[16] One option for reform would be to allow a person's pension to rise more slowly in the pension-drawing period after they have entered retirement. Even so, the replacement rate upon retirement would remain stable. This is the case, for example, in schemes where pensions in payment are indexed to inflation, an approach adopted in many other countries. Compared with wage indexation (i.e. stable replacement rate upon retirement and during the pension-drawing period), price indexation, in and of itself, relieves adjustment pressure on pension funding: the contribution rate and government funds required increase more slowly. Hybrid formats are also conceivable, though: these would entail pensions growing after retirement in line with an index that includes both price and wage developments. The effects would then lie between those of either pure wage or pure price indexation. In order to illustrate these effects more clearly, this article explores a changeover to pure price indexation. The simulations also switch all pensions in payment over to the new system.[17]

During pension-drawing period: compensate for price increases

In the simulations, pensions increase in line with changes in prices during the pension-drawing phase. These changes are measured by growth in the consumer price index. As a result, price increases during the pension-drawing period do not diminish pensions' purchasing

14 The ratio to value added is harder to capture. A comparison to VAT makes it possible to illustrate relative magnitudes of the effects of individual measures; see Deutsche Bundesbank (2019).
15 Rising or falling social security contribution rates (with the exception of health insurance contributions, of which pension recipients and employed persons have to pay half) influence the replacement rate. This is due to the fact that pension recipients, for example, pay their full contribution to the long-term care insurance scheme on their own. The level of standard pension available as well as the replacement rate decline when this contribution rate increases.
16 The increasing taxation of pensions is not reflected in the replacement rate.
17 This should not be interpreted as a recommendation for action. If political consideration were to be given to a changeover, this could take a number of forms. Amongst other things, a decision would need to be made on how the pensions of individuals already in retirement at the end of 2025 would be transferred to the new system. Depending on how it is designed, this would have different financial implications for the statutory pension insurance scheme.

power.[18] However, the ratio of an individual's pension to the current average wage of employees decreases as the period over which pensions are paid increases in length. This is because (per capita) wages can be expected to continue rising more strongly than prices on average in the future. They generally depend on labour productivity growth plus price increases.

Assumptions regarding trend productivity and price growth

The following simulations show the effects of switching to inflation indexation from 2026 onwards.[19] The year 2026 is a logical choice because the rules currently in place will expire beforehand and the Federal Government is devising new ones. The simulations are based on the following annual assumptions, which are comparable to those used in other studies:

- In line with the Eurosystem's target, trend inflation is set at 2%.[20] In an inflation-indexed system, pensions will thus grow by an average of 2% per year. In recent years, inflation rates were lower than this target. At present, though, exceptionally high rates are being observed. Inflation rates may deviate temporarily from the Eurosystem's inflation target. The longer term is what is important here, though: in principle, it is assumed that values above and below the target will offset each other over the long term and that the European Central Bank will achieve the inflation target on average.

- Average wages will see trend growth of 3% (gross, i.e. before deducting social security contributions and taxes). The increase would be broadly compatible with the above-mentioned price increase of 2% and trend labour productivity growth of 1%. Other long-term estimates are based on similar values.[21] Together with employment, wages determine the level of contribution receipts collected by the statutory pension insurance scheme.

Assumptions of this nature are often subject to some uncertainty. If what actually occurs deviates from what has been assumed, the way in which pensions, the contribution rate and government funds will develop could differ significantly. Generally speaking, a more favourable development of real wages for contribution payers and taxpayers leads to lower replacement rates for pension recipients, and vice versa. Possible concrete effects and responses to them will be discussed below.

Assumptions subject to uncertainty

Outlook for single retirement cohorts

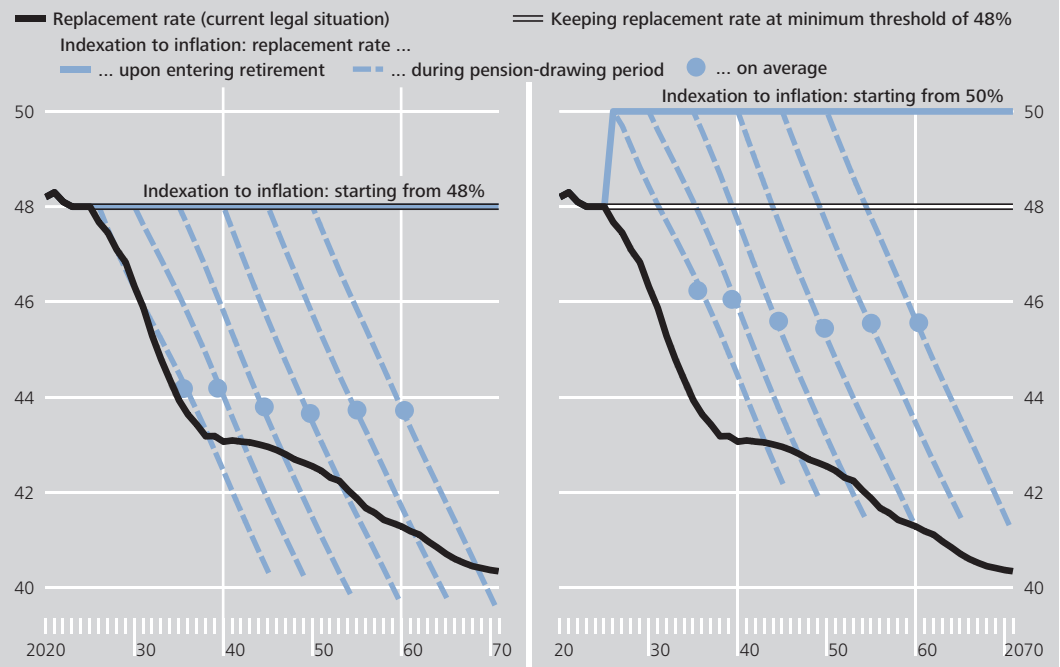
Inflation indexation: replacement rate falls over pension-drawing period

The chart on p. 53 shows the effect that inflation indexation of this nature has under the assumptions made. It illustrates the impact on the individual replacement rate during the pension-drawing period for various retirement cohorts (from 2026).[22] The initial replacement rate is an important parameter, and the level at which it is set is ultimately a political decision. For example, after 2025, the minimum threshold of 48% could serve as the starting value. Over the course of retirement, the replacement

18 Rising social security contributions and taxes reduce pensions' purchasing power, however. In the simulations, the contribution rate to the statutory pension insurance scheme increases. This lowers average disposable earnings. The replacement rate (pension in relation to wages after contributions) is then higher. As a result of this effect, the replacement rate is not linear during the pension-drawing period (see the chart on p. 53). What is not taken into account is the likely countereffect stemming from the contribution rates for long-term care insurance. If these rise as expected, a heavier burden will be placed on pension recipients, as they pay the full contribution on their own. The replacement rate will then fall somewhat more sharply.
19 The simulations are performed using the Bundesbank's overlapping generations (OLG) model. For more information, see Schön (2020). The model has been updated and factors in actual developments up to the present.
20 This corresponds (by chance) to the average pension increases expected between 2026 and 2035 under current law, as per the Federal Government's latest pension insurance report. See Federal Ministry of Labour and Social Affairs (2021).
21 In the pension insurance report, the Federal Government also assumes wage growth of 3% in the longer term and productivity growth of 1%; see Federal Ministry of Labour and Social Affairs (2021). In the latest report of the European Commission's Ageing Working Group, higher labour productivity growth of 1.4% is assumed for Germany in the longer term; see European Commission (2021).
22 The simulations for inflation indexation assume that retirement commences on 1 July of a given year. The first adjustment then takes place 12 months later on 1 July of the following year. For a discussion of the transition for individuals who are already in retirement at the time of the changeover, see the later sections of this article.

Pension in relation to average wage given different adjustment rules*

As a percentage of average wages after deduction of social security contributions and before taxes for the respective year



* Standard pension relative to average wage pursuant to Annex 1 of the Sixth Book of the Social Security Code. A person making average contribution payments receives a standard pension after retiring at the statutory retirement age after 45 years. At the start of the pension-drawing period, the pension to wage ratio is 48% or 50% respectively. Over the course of the pension-drawing period, it declines as shown by the dashed lines. This decline results from the fact that a person's pension rises in line with inflation rather than with the more rapidly increasing average wage. The dots show the average replacement rate of an average pension-drawing period.

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rate decreases because the average wage increases more strongly than pensions adjusted for inflation. However, the real value of the pension does not change. On average, the replacement rate is just under 44% over an average pension-drawing period. This is markedly higher than in the baseline scenario under current law, especially for those entering retirement from 2035 onwards. However, individual replacement rates are then lower at the end of the pension-drawing period than the replacement rates in the baseline scenario.[23]

Given initial rate of 50%, average replacement rate at 46% over pension-drawing period

The initial rate can also be set higher or lower. The above chart additionally shows the effects of a second simulation with an initial rate of 50%, run to serve as an example.[24] Compared with the baseline scenario, individual pensions are higher for all future generations under the simulated reform, both upon retirement and over the course of retirement (given an average life expectancy). At just under 46%, the average replacement rate for pension recipients is then higher across the entire pension-drawing period. Individual replacement rates at the end of an average pension-drawing period are lower than in the baseline scenario for those who retire before 2040, but not significantly so. For those who enter retirement from 2040 onwards, the rates are higher over the entire period of pension payment modelled.

Replacement rate between baseline scenario and government plans for a 48% minimum threshold

How does inflation indexation at an initial replacement rate of 50% compare with the government plans to keep the replacement rate constant at 48%? The individual replacement rate is higher in the first five years after entering retirement. This is because inflation indexation starts from a higher level (50%). However, the rate then falls below 48% over the remain-

23 This applies given the assumed difference between wage growth and inflation and an average pension-drawing period.

24 For individuals who are already drawing pensions at the time of the changeover, the standardised replacement rate increases by 2 percentage points to 50%.

Simulation: indexation of pensions in payment to inflation

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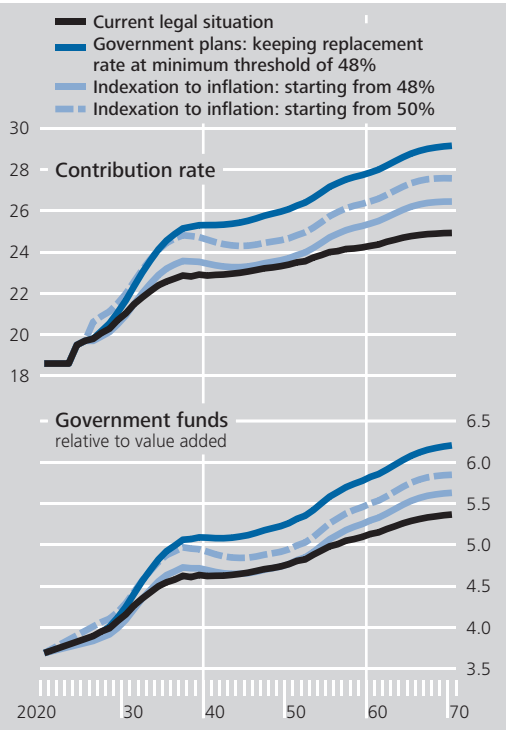

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der of the pension-drawing period. The replacement rate is also lower on average over the pension-drawing period than it would be under the government plans. In this respect, the simulated reform falls somewhere between the government plans (with the replacement rate fixed at 48%) and the baseline scenario. This therefore results in lower burdens for contribution payers and taxpayers than under the government plans and higher burdens than in the baseline scenario (see below).

Outlook for the pension insurance scheme, for contribution payers and taxpayers

Given an initial rate of 48%, contribution rate and government funds needed higher than in baseline scenario and lower than under government plans

In the first simulation of inflation indexation, the initial replacement rate is 48%. Consequently, pension expenditure is significantly lower than under the government plans to maintain a stable replacement rate upon retirement and during the pension-drawing period. The contribution rate will still rise significantly to 26½% by 2070 (see the chart above). However, this is just over 2½ percentage points lower than under the government plans. The government funds required also grow by a lesser amount, though by 2070 they will have still increased by just under 2 percentage points of value added. From today's perspective, this corresponds to the revenue from almost 5 percentage points of the standard VAT rate. This would be 1½ percentage points less than under the government plans. Still, compared with the baseline scenario, the contribution rate and government funds needed are considerably higher.

Given an initial rate of 50%, higher pensions in payment, contribution rates and government funds required at point of changeover

In the scenario with an elevated initial replacement rate of 50%, pensions in payment also jump from 48% to 50% at the time of the changeover in 2026. In this scenario, pension expenditure rises markedly at first. This explains why the contribution rate and government funds increase more sharply for a time (see the adjacent chart). In the longer term, however, the financial burdens in this scenario likewise lie somewhere between the baseline scenario and the government plans. Compared with the government plans, the contribution rate is 1½ percentage points lower in 2070 following a markedly faster increase up to the mid-2030s. In 2070, however, it is still 2½ percentage points higher than in the baseline scenario. By 2070, government funds will have increased by 2 percentage points (corresponding to revenue from just over 5 percentage points of the standard VAT rate).

Selected other aspects of inflation indexation

Stabilisation of purchasing power versus wage orientation from the perspective of persons covered by the pension insurance scheme

Replacement rate during pension-drawing period depends on real wage growth

When pensions are indexed to inflation, they are decoupled from wage developments in the pension-drawing period. As a result, pensions in payment are no longer tied to productivity growth and associated increases in prosperity. The individual replacement rate during the

pension-drawing period differs according to growth in real wages. If real wages record trend growth of only 0.6% per year instead of the 1% assumed in the simulations, the replacement rate will be on average just over 1½ percentage points higher following an average pension-drawing period (year of retirement: 2026). By contrast, if they increase by 1.4%, the rate will be just over 1½ percentage points lower.

Higher initial replacement rate could partly compensate for falling replacement rate over course of retirement

The declining replacement rate during the pension-drawing period and the uncertainty surrounding this could hamper the acceptance of such a reform. A higher initial replacement rate could mitigate these effects. However, the contribution rate and the government funds required will then be higher. With regard to a declining replacement rate during the pension-drawing period, however, it should be borne in mind that, in the baseline scenario (the legal status quo), the replacement rate applicable upon retirement decreases over time anyway.

Stabilisation of purchasing power versus wage orientation from the perspective of the pension insurance scheme

Added source of uncertainty for pension funding: real wage developments

The financial situation of the pension insurance scheme does not currently depend on the scale of real wage increases. While higher real wage increases – for example, due to higher productivity – increase revenue, this is offset by higher spending on pensions. By contrast, when switching to inflation indexation, real wage developments play a role in pension funding. In line with other long-term calculations, the simulations assume an annual trend increase in real wages of 1%. However, this assumption is subject to some uncertainty:

– Real wages could rise more strongly than assumed. For example, digitalisation could increase the demands made of employees. If this increases the level of qualification in the workforce on average, labour productivity growth will increase.
– Real wages could rise more slowly than assumed, as, for instance, setbacks in the international division of labour and climate-friendly production changes could dampen real wage growth.

Contribution rate sensitive to real wages

In this respect, the long-term outlook for pension funding is less predictable when pensions are indexed to inflation. For example, if growth in real wages is 0.4 percentage point stronger than assumed, the contribution rate will be around 1 percentage point lower in 2070. The same applies, with the inverse sign, given a weaker rise in real wages. As things currently stand, real wages are not expected to see zero growth over a longer period (with wages then only rising in line with the inflation rate). However, if they were not to increase in the long term, the replacement rate would actually rise throughout the pension-drawing period as a whole. This is due to rising pension contribution rates. In the case of inflation indexation, these only place a burden on the contribution payers. Due to the fact that, taken in isolation, this lowers average disposable earnings, the replacement rate rises. On balance, then, the burden on contribution payers and taxpayers is even higher than at a constant replacement rate of 48%.

Inflation indexation from a monetary policy perspective

Possible changeover not problematic from a monetary policy perspective

From a monetary policy perspective, broadly automatic price indexation mechanisms are generally problematic. Under certain circumstances, many people may then begin to lose interest in stable prices, raising the spectre of inflation expectations becoming de-anchored. Rising inflation would be more likely. For example, price-indexed rents increase inflation, assuming they are included in the price index. In the case of wages, indexation could lead to second-round effects that reinforce the inflationary process. Neither is the case when switching to price indexation of pensions in payment. Pensions impact aggregate demand, and indexation to inflation could thus have a

procyclical effect. On the other hand, inflation indexation replaces an existing wage indexation mechanism, which is generally likely to have a more procyclical effect than price indexation. A changeover from wage indexation to price indexation for pensions therefore appears to give little cause for concern from a monetary policy perspective and is viewed as unproblematic in other countries as well.

Inflation indexation and effects given heterogeneity in life expectancies

Average replacement rate decreases as pension-drawing period becomes longer

As a general rule, inflation indexation changes the way in which funds from the statutory pension insurance scheme are distributed throughout a cohort's retirement: based on a stable initial replacement rate upon retirement, the rate decreases continually during the pension-drawing period. This means that, unlike under the status quo, the replacement rate averaged over the entire pension-drawing period becomes lower the longer a person lives. The average replacement rate over the retirement period as a whole also falls, by around ⅕ percentage point per additional year of retirement.

Those who live longer (typically higher earners) bear more costs of changeover, relatively

Empirical studies show a correlation between remaining life expectancy and income.[25] It is therefore individuals who tend to have higher incomes (and live longer) who bear a comparatively higher burden in the event of a changeover to inflation indexation.[26] Regardless of these general observations, there are, of course, also people with long life expectancies who receive a low statutory pension and do not have any other old-age income (not even in the same household). Although the purchasing power of their pensions is preserved, the replacement rate declines. These individuals therefore tend to reach or fall below poverty thresholds during the pension-drawing period. This is because these thresholds increase in line with real wages – at least in part.[27] In Germany, if household income and wealth drop below certain thresholds, support is then provided in the form of a means-tested basic allowance for the elderly.[28]

Indexing retirement age to life expectancy

Combination of baseline scenario and government plans

Systematically link retirement age to life expectancy

Rising life expectancy will gradually put more pressure on the pension insurance scheme if the statutory retirement age remains unchanged as from 2031. The following simulations are based on earlier Bundesbank calculations concerning the retirement age.[29] They assume that after 2031, the retirement age will go up such that the average ratio of years in retirement to years of contributions remains at around the level reached in 2031 – just over 40%.[30] Based on the underlying assumptions

25 Lampert et al. (2019) and Haan and Schaller (2021) conclude that remaining life expectancy for people over 65 is significantly shorter for those with low incomes than for those with high incomes.
26 Compared to wage indexation, inflation indexation eases the overall burden on pension funding if individuals with higher pensions (more earnings points) draw a pension for longer. Inflation indexation means that when pensions are drawn over a longer period, the average replacement rate decreases, which then disproportionately affects those with higher pensions. This effect, which tends to dampen the contribution rate, is not taken into account in the simulations because they do not include households with heterogeneous incomes.
27 Börsch-Supan and Rausch (2021) show that, at an initial replacement rate of 48% and a pension of 80% of the standard pension, the poverty threshold might be undershot after a pension-drawing period of 20 years. The calculations assume annual productivity growth of 1.2%. As a result, the replacement rates fall more sharply during the pension-drawing period than in the simulations carried out for this article.
28 On average, women have longer life expectancies than men. In this regard, their retirement periods are longer. Switching to inflation indexation would therefore place a heavier burden on them, as described for longer life expectancies. This will be the case as long as life expectancy for women and men does not fully converge in the future.
29 See Deutsche Bundesbank (2019). Here, the higher retirement age was only combined with the legal status quo. A simulation for a higher retirement age with a threshold of 48% is not included.
30 This relative pension-drawing period represents the ratio between a standardised period of pension payment (remaining life expectancy as from the statutory retirement age) and a standardised period of employment. The period of employment is assumed to start at 20 years of age and last until the statutory retirement age.

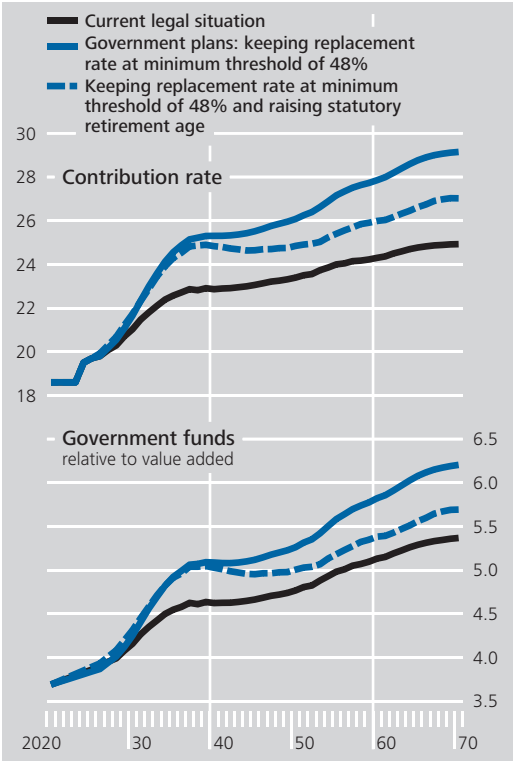
regarding life expectancy, the statutory retirement age then rises to just over 69 by 2070.[31] If, for example, life expectancy were to increase more slowly, the retirement age would automatically be raised less sharply. As is already the case today, not everyone will be able to work up to the statutory retirement age. It is therefore important to provide a safety net in the form of the reduced earnings capacity pension, which has also been expanded markedly of late.

Higher retirement age dampens growth in contribution rate and government funds

The simulations up to 2070 show that the pressure on pension funding eases noticeably if the retirement age continues to rise gradually after 2031 (see the adjacent chart). Although the contribution rate and government funds still undergo a considerable increase, they rise less sharply over the long term than they would if the retirement age were to remain the same. At a threshold of 48% after 45 years of contributions, the contribution rate for 2070 is 2 percentage points lower, at 27%. Demographic developments also place less strain on the budgets of the various levels of government because tax revenue rises off the back of the longer period of employment. Moreover, the necessary tax-financed government funds are lower than if the retirement age were to remain unchanged. Although their ratio to value added increases by 2 percentage points compared with 2021 (just under 5 percentage points of the standard VAT rate), in terms of value added, this is ½ percentage point less than if the retirement age remains unaltered.[32]

Simulation: indexation of retirement age

%



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Dynamically adjusted replacement rate noticeably higher when retirement age is raised

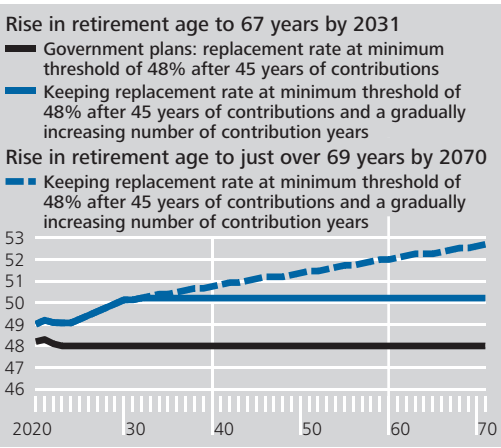
Contribution years rise in line with higher retirement age

The previously discussed standardised replacement rates following 45 years of contributions fail to take into account that the number of contribution years tends to increase in line with the rising retirement age. The retirement age has risen gradually since 2012 – since then, it has been observed that, on average, people are also entering retirement progressively later.[33] Longer periods of employment thus mean that pension entitlements also grow. This is also to be expected if the retirement age continues to rise after 2031.[34] This effect can be modelled using a dynamically adjusted replacement rate. The dynamically adjusted replacement rate takes into account the fact that contribution years increase when the retirement age rises. It is then no longer calculated on the basis of a constant 45-year contribution period. Instead, the contribution years factored into the dynamically adjusted replacement rate

31 The recommendation of the Board of Academic Advisors at the Federal Ministry for Economic Affairs and Energy results in a somewhat higher retirement age in 2070. See Federal Ministry for Economic Affairs and Energy (2021), p. 25.
32 A combination of inflation indexation and an indexed retirement age sees the contribution rate in 2070 reach a level of just over 25½% (for an initial level of 50%) and 24½% (for an initial level of 48%).
33 This is shown by the data provided by the German statutory pension insurance scheme; see Forschungsdatenzentrum der Rentenversicherung (2020).
34 For more detailed information, see Deutsche Bundesbank (2019), p. 71.

Pension in relation to average wage given an increasing number of contribution years*

%



* Standard pension relative to average wage pursuant to Annex 1 of the Sixth Book of the Social Security Code. However, the definition of the standard pension differs from that in the previous charts. This chart illustrates the case of a person with average contribution payments who becomes subject to unemployment insurance contributions at 20 years old and enters retirement at the (rising) statutory retirement age. The later the person enters retirement, the more earnings points they have accrued and the higher the ratio to the average wage is, e.g. a person who enters retirement in 2026 (2031) is 66 1/3 (67) years old and has accrued 46 1/3 (47) earnings points. As from the start of the 2030s, the statutory retirement age is tied to life expectancy and is set to rise to 69 years by 2070.

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are based on the difference between the applicable statutory retirement age and the age of 20 (assumed entry into the workforce).

Dynamically adjusted replacement rate gradually becomes higher

The dynamically adjusted replacement rate gradually becomes higher over time as the retirement age increases (see the chart above). The retirement age is already set to rise to 67 under current legislation. 2031 will be the first year in which people reach the standard retirement age at 67.

With threshold of 48%, dynamically adjusted replacement rate stands at 52½% in 2070

For example, the dynamically adjusted replacement rate is correspondingly higher after a contribution period of 45 years if the 48% threshold is maintained. For a person who retires in 2031 after 47 years of contributions, it stands at 50%.[35] If the retirement age subsequently continues to climb, the dynamically adjusted replacement rate comes to just under 52½% in 2070, after a contribution period of just over 49 years.[36]

Use dynamic variables when defining thresholds or the initial replacement rate

The political debate has disregarded this issue so far. When defining thresholds or stable initial replacement rates, it could be worth factoring in the additional contribution years – this would mean that the replacement rate would be calculated dynamically, thus taking into account the growing pension entitlements. At the same time, this curbs the rise in the contribution rate.[37] This applies to any potential raising of the retirement age after 2031. However, this kind of adjustment could also be examined for the period up to 2031, regardless of whether the retirement age is raised further.

Conclusion

Disclose financial burdens of a reform through long-term projections

It is up to policymakers to decide how demographic burdens should be shared between employed persons, taxpayers and pension recipients. They must also take into account the effects on growth and employment. After all, high levels of employment are a key component in easing the demographically-induced financial pressure on the pension insurance scheme. To enable a comprehensive and well-founded debate, it is important that the government uses long-term, plausible projections to show how its intended approach affects the variables of the pension insurance scheme. Given all the estimation uncertainty, there is much to suggest that a far longer projection horizon should be used than in the current pension insurance reports. The calculations should also provide guidance for those who are presently at the beginning of their working life.

35 In each case, this is the replacement rate at the time the individual enters retirement. The dynamically adjusted replacement rate then remains unchanged after entry into retirement because no additional contribution years are accumulated during the pension-drawing period.
36 The dynamically calculated replacement rate is also significantly higher in the baseline scenario; for more information about this and potential options for the pension adjustment formula, see Deutsche Bundesbank (2019), pp. 73 ff.
37 For more detailed information about the dynamically adjusted replacement rate, see Deutsche Bundesbank (2019).

Permanent replacement rate of 48%: contribution rate and government funds rise considerably

This article first uses long-term simulations to illustrate the effects arising from the legal status quo. Another simulation shows the effect of a permanently stable replacement rate of 48% after a contribution period of 45 years (government plans). In this context, from the 2030s onward, the statutory retirement age remains unchanged at 67. Under these assumptions, the contribution rate rises very sharply from its current figure of 18.6% to a level of 29%. The contribution rate is thus significantly higher than in the legal status quo, in which the replacement rate is set to decline. The high contribution rate is in line with projections by other institutions. The sharper rise in government funds needed also puts the Federal budget under significant financial pressure. However, it will probably not be possible to free up these additional funds without cutting expenditure elsewhere or increasing taxes.

Inflation indexation may relieve pressure on pension funding, but makes pension funding less predictable

Further simulations illustrate the indexation of pensions in payment to inflation – an approach used in many other countries. Depending on the design of the parameters, it can ease the pressure on pension funding. The contribution rate and the government funds needed will then increase less sharply. Although inflation indexation compensates for price increases during the pension-drawing period and purchasing power is thus retained, the replacement rate declines continuously during the retirement period as real wages continue to grow. Pension recipients who live longer will therefore bear a greater share of the burden stemming from such a change. According to empirical studies, these tend to be people with higher incomes. Another difference affects the predictability of pension funding. Switching to inflation indexation would make future financial developments in pension funding less predictable than under current legislation because pension funding is also linked to developments in real wages. Taken in isolation, heightened uncertainty of this kind is one disadvantage to inflation indexation.

Cushion financial burdens through a higher retirement age

Many of the institutions that advise the Federal Government on matters of economic policy recommend that the retirement age be tied to life expectancy. Indeed, it would make sense to broadly stabilise the relationship between years in retirement and years of contributions, say. In the scenario simulated for this purpose, the retirement age rises from 67 to just over 69 between the early 2030s and 2070. This curbs the increase in the contribution rate. In 2070, given a minimum threshold of 48% for the replacement rate, the contribution rate comes in at around 27% (instead of 29% without a higher retirement age).

Consider accounting for additional contribution years when defining thresholds or initial replacement rates

In the past, insured persons gradually shifted their actual date of retirement back as the retirement age increased. If insured persons continue to postpone their retirement in line with the statutory retirement age, this will support their individual pension. The individual (dynamically adjusted) replacement rate will develop more favourably than the recognised replacement rate after 45 years of contributions. If the latter is constant at 48%, the dynamically adjusted replacement rate will come to 50% in 2031. When defining thresholds or stable initial replacement rates, it could be worth factoring in the additional contribution years. This would mean that the rate would be calculated dynamically. Moreover, longer periods of employment and rising life expectancy support macroeconomic developments. In this way, they contribute to the successful management of demographic change beyond their role in the pension insurance scheme.

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